



Clinical Update

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Pulpal and Apical Diagnoses

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Purpose

In December 2009, the Journal of Endodontics published an update of Endodontic Terminology from the American Association of Endodontists (1). The purpose of this Clinical Update is to ensure that military clinicians are informed of the revised terminology for endodontic diagnoses. The use of these terms at the Naval Postgraduate Dental School (NPDS) replaces the previous Clinical Updates on terminology (2,3).

The significant changes reflect a clinical diagnosis made without an over-reliance on a radiographic interpretation or an attempt to relate a histological diagnosis. The diagnosis relies on the signs and symptoms of the patient on the day seen by the provider. Another change is replacement of the previously used terms “periradicular” and “periapical” with “apical” to describe the tissues surrounding the root-end.

It is critically important to have a standard diagnostic terminology because of the wide variety of training backgrounds of military dental officers and civilian dentists serving for the U.S. Navy. Standardization of terminology within Navy Dentistry will improve communication between all clinicians.

Diagnostic Procedures

Diagnosis is defined as “the art of distinguishing one disease from another” (4). In endodontics, diagnostic procedures should follow a consistent, logical order and include a review of medical and dental histories and clinical and radiographic examinations. The clinical examination consists of extraoral and intraoral evaluations and diagnostic tests. During examination procedures, assessment and reproduction of the patient’s chief complaint are imperative (5-7). The results of the examination and diagnostic tests should culminate in two-parts that includes **pulpal and apical diagnoses**.

Pulpal Diagnosis

All of the following are clinical diagnoses based on subjective and objective findings (8).

Normal Pulp. A normal pulp is symptom free and will be normally responsive to pulp testing (8). When evaluated by the electric pulp tester (EPT) or thermal testing, the normal pulp produces a positive response that is mild and subsides immediately when the stimulus is removed (10).

Reversible Pulpitis. Caries, cracks, restorative, periodontal procedures or trauma may cause a pulp to become inflamed. The patient’s chief complaint is usually of an exaggerated response to thermal stimulus but once the stimulus is removed, the discomfort quickly disappears. EPT results are also responsive (10). The findings indicate “that the inflammation should resolve and the pulp returns to normal” (8).

The terms “symptomatic” and “asymptomatic” have been added to the diagnosis of “irreversible pulpitis”. The new terminology allows the clinician to notate whether the indication for root canal treatment is the result of irreparable symptoms or a pulp exposure.

Symptomatic Irreversible Pulpitis. Patients may have a history of spontaneous pain and/or complain of an exaggerated, lingering response to hot or cold. EPT results are responsive. There must be an identifiable avenue for microbial invasion of the pulp prior to initiation of the root canal treatment. The involved tooth may present with a history of a large restoration, caries, severe periodontal disease, trauma, crack or fracture. The result is a vital inflamed pulp incapable of healing (8).

Asymptomatic Irreversible Pulpitis. The patient presents symptom-free. Root canal treatment is necessitated by pulp exposure resulting from caries, caries excavation or trauma (8).

Pulp Necrosis. Necrosis is a histologic term that denotes pulpal death. Since necrosis is the end state of irreversible pulpitis, affected teeth may present with variable symptoms, especially multi-rooted teeth. Still, the clinical diagnosis of pulp necrosis has a high correlation with the histologic state when the pulp does not respond to EPT and thermal testing. Occasionally, a necrotic pulp will have positive response to heat testing (8). At NPDS, a tooth that does not respond to digital EPT testing is notated as NR/80.

Previously Initiated Therapy. This term describes a tooth with prior treatment of partial endodontic therapy (eg. pulpotomy, pulpectomy) regardless of symptoms or pulp testing results (8). When dental history and clinical examination indicate previously initiated therapy, a careful radiographic examination should be completed prior to accessing the tooth. Review images for signs of procedural errors and canal contents which complicate the continuation of care.

Previously Treated. The preferred term used in reference to endodontically treated teeth. This term does not distinguish

between surgical and nonsurgical treatment, the obturation material and whether therapeutic treatment is to induce apexogenesis (8). Previously treated teeth should be carefully examined with a review of dental history and clinical and radiographic examination. The decision to retreat and how to retreat should be based on all of the data gathered. Treatment planning for extraction of an endodontically treated tooth with questionable prognosis should not be done without consultation of the endodontist.

Apical Diagnosis

Normal Apical Tissues. Teeth with normal apical tissues that are not sensitive to percussion or palpation testing. The lamina dura surrounding the root is intact, and the periodontal ligament space is uniform (9, 2).

In diagnosing apical periodontitis, the words “acute” and “chronic” have been replaced with the more clinically suitable “symptomatic” and “asymptomatic”.

Symptomatic Apical Periodontitis. The etiology could be pulpal disease (usually a necrotic pulp) or occlusal traumatism. It is defined as “inflammation, usually of the apical periodontium, producing clinical symptoms including a painful response to biting and/or percussion or palpation. It might or might not be associated with an apical radiolucent area” (9).

Asymptomatic Apical Periodontitis. This term implies “inflammation and destruction of apical periodontium” (9). The etiology is of pulpal origin and since there are no clinical symptoms for the patient to report, it relies on the associated diagnosis of necrotic pulp and the radiographic appearance of an apical radiolucency (9). These teeth may also have a history of previous treatment with no response to pulp testing.

Utilization of the terms “symptomatic” and “asymptomatic” in describing the clinical appearance of an abscess are inappropriate since each can present with signs and symptoms. The words “acute” and “chronic” are retained in the updated terminology.

Acute Apical Abscess. It is supposed that microbial invasion and an inflammatory reaction have progressed overloading the patient’s immune response. Acute apical abscess is characterized by rapid onset, spontaneous pain, exquisite tenderness to pressure or tooth percussion, pus formation, and swelling of associated tissues (9). Depending upon the location of tooth apices and muscle attachments, swelling will involve the buccal vestibule, lingual or palatal tissues or potential fascial spaces. Although there is often an associated radiolucency, there can be absence of a distinguishable lucency. The diagnosis is not dependent upon the radiographic presentation.

Chronic Apical Abscess. Although this clinical presentation has been renamed (formerly chronic periradicular abscess and suppurative periradicular periodontitis) the description is unchanged. It is an inflammatory reaction to pulpal infection and necrosis characterized by gradual onset, little or no discomfort,

and the intermittent discharge of pus through an associated sinus tract (9).

Condensing Osteitis. This apical diagnosis is dependent upon a radiographic appearance of diffuse radiopaque lesion usually seen at the tooth apex. There should be an identifiable etiology for pulpal infection, such as an extensive restoration, caries, crack or necrotic pulp. Pulpal symptoms will vary. The affected tooth may or may not be sensitive to percussion and palpation. Evidence supporting consideration as a lesion of endodontic origin (LEO) is that 85% of the radioopacities resolve after endodontic treatment (10). It represents a localized bony reaction to a low-grade inflammatory stimulus (9).

Summary

The importance of clear communication cannot be overemphasized. Proper documentation in dental records keeping is essential for both the dentist and the patient (11). It is the licensed professional’s responsibility to stay current with advancements in dentistry, including the proper use of terms and changing vocabulary. In Navy Dentistry, it also behooves the provider to be aware of what is taught to the next generation of specialists at the Naval Postgraduate Dental School.

Table 1 is provided to aid the clinician in choosing the appropriate terms when determining pulpal and apical diagnoses for his/her patient. Table 1 also contains suggested abbreviations for annotating the results of pulpal and apical tests in the dental record.

References

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| <i>Pulpal Diagnosis</i> | Chief Complaint | History | Radiographic Findings | EPT | Thermal Testing | | | | Other |
|---|---|---|--|-------------------------------|-------------------------------|-------------------------|------------------------|-----------------|---|
| Normal Pulp | None | None | Normal | R | R, NL | | | | |
| Reversible Pulpitis | Thermal Sensitivity | Thermal Sensitivity | Normal | R | Exaggerated, NL | | | | Caries, Cracks, Restorative Procedures, or Trauma |
| Symptomatic Irreversible Pulpitis | Thermal Sensitivity | Thermal Sensitivity and/or Trauma | Normal, ARL, or Widened PDL | R | Exaggerated, L | | | | |
| Asymptomatic Irreversible Pulpitis | None | Cariou Exposure | Normal, ARL or Widened PDL | R | R | | | | |
| Pulp Necrosis | Variable; May respond to heat | Variable Symptoms | Normal, ARL, or Widened PDL | NR | NR | | | | |
| Previously Initiated Therapy | Variable | Partial Endodontic Treatment | Normal, ARL or Widened PDL | May Respond | May Respond | | | | |
| Previously Treated | Variable | RCT | Normal, ARL or Widened PDL | Usually Non- Responsive | Usually Non- Responsive | | | | |
| <i>Apical Diagnosis</i> | Chief Complaint | History | Radiographic Findings | EPT | Thermal Testing | Percus- sion | Palpa- tion | Mobility | Other |
| Normal Apical Tissues | None | None | Normal | | | NS | NS | WNL | |
| Symptomatic Apical Periodontitis | Pain When Biting or Chewing | Variable Symptoms | Normal, ARL or Widened PDL | | | S | S or NS | Possible | Rule out Occlusal Traumatism |
| Asymptomatic Apical Periodontitis | None | Variable Symptoms | ARL | NR | NR | NS | NS | Possible | |
| Acute Apical Abscess | Pain and/or Swelling | Variable Symptoms | Normal, Widened PDL, or ARL | | | Exquisitely S | S | Possible | |
| Chronic Apical Abscess | None/Limited ("Bad Taste/Gum Bump") | Little/No Discomfort | ARL | | | NS | NS | Possible | Sinus Tract |
| Condensing Osteitis | Variable | Extensive Restorative History / Crack | Increased Radiodensity / Opacity | R or NR | R or NR | S or NS | S or NS | WNL | |

WNL = Within Normal Limits
ARL = Apical Radiolucency

L = Lingering NL = Non-lingering
RCT Root Canal Therapy

S = Sensitive

NS = Non-sensitive

R = Responsive

NR = Non-responsive